

# Installation Instructions

## HP StorageWorks Replacing an HSG60 or HSG80 Array Controller

*Read instructions completely before  
beginning the installation procedure*



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### About these instructions

This document contains instructions for replacing an HP StorageWorks HSG60 or HSG80 array controller. Array controller replacement procedures in these instructions include:

- [Replacing HSG60 and HSG80 controllers in single-controller configurations](#), page 3
- [Replacing HSG60 and HSG80 controllers in dual-redundant controller configurations](#), page 5

### Prerequisites and special considerations

Observe the following prerequisites and special considerations *before* replacing an HSG60 or HSG80 array controller:

- **Single-to-Dual-redundant configuration upgrades**—For instructions on upgrading a single-controller configuration to a dual-redundant controller configuration, refer to the appropriate documentation that shipped with your array controller or subsystem component.
- **DRM Configurations**—If you are using HP StorageWorks Data Replication Manager (DRM) with HSG60 or HSG80 controllers that need to be replaced, refer to the *HP StorageWorks HSG60 and HSG80 Array Controller and Array Controller Software Maintenance and Service Guide* for specific instructions. A copy of this guide can be downloaded from the HP website at: <http://h18006.www1.hp.com/products/storageworks/acs/index.html>.
- **Hardware Compatibility**—The replacement controller hardware must be compatible with the remaining controller hardware. Refer to product-specific release notes and documentation for information regarding hardware compatibility.
- **Software Compatibility**—The software versions and patch levels of the replacement controller must be the same as that of existing subsystem controllers.

### General information

[Figure 1](#), [Figure 2](#), and [Figure 3](#) (on page 2) provide general information about the HSG60 and HSG80 array controllers and specific host cable connections for each array controller type.

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**Tip:** See the applicable array controller figure ([Figure 1](#), [Figure 2](#), or [Figure 3](#) on page 2) for clarification during the selected procedures.

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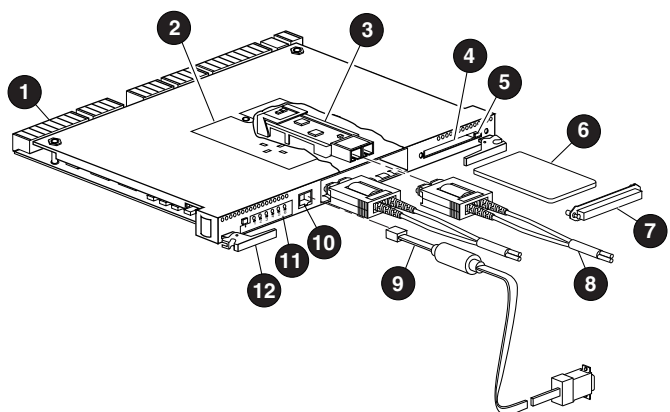
**Note:** The maintenance port cable shipped with the array controller has a 9-pin connector for a PC connection only. If you are using a terminal instead of a PC, obtain the optional maintenance port cable.

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Replacing an HSG60 or HSG80 Array Controller Installation  
Instructions

Sixth Edition (March 2005)

Part Number: EK-80CTL-IM. F01



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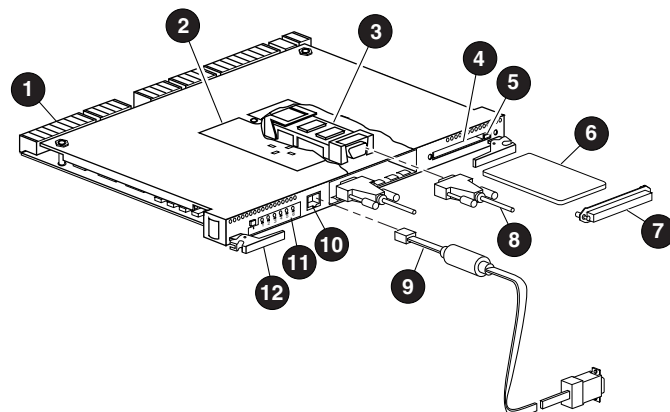
- ❶ Backplane connector
- ❷ Access door
- ❸ Optical gigabit link module (GLM)
- ❹ Program card slot
- ❺ Program card Ejection button
- ❻ Program card
- ❼ Program card electrostatic discharge (ESD) cover
- ❽ Fibre Channel optical host bus adapter
- ❾ Maintenance port cable for a PC connection
- ❿ Maintenance port
- ⓫ Operator control panel and controller LEDs
- ⓬ Release lever

**Figure 1: HSG60 or HSG80 array controller with optical GLM**

In [Figure 1](#), 9-pin D-sub to 25-pin D-sub adapters are not shown. [Table 1](#) lists optional adapters that can be used for terminal connections on HSG60 and HSG80 array controllers. Part numbers for these adapters are also listed.

**Table 1: Optional Adapters for a Terminal Connection**

Description	Part Numbers
Male-to-female (null modem)	173407-001 / 12-45238-01
Male-to-male (null modem)	173407-002 / 12-45238-02
Male-to-male (modem)	173407-003 / 12-45238-03



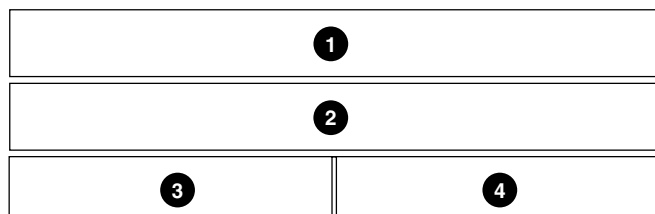
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- ❶ Backplane connector
- ❷ Access door
- ❸ Copper GLM
- ❹ Program card slot
- ❺ Program card Ejection button
- ❻ Program card
- ❼ Program card ESD cover
- ❽ Fibre Channel copper host bus cables
- ❾ Maintenance port cable for a PC connection
- ❿ Maintenance port
- ⓫ OCP and controller LEDs
- ⓬ Release lever

**Figure 2: HSG60 or HSG80 array controller with copper GLM**

**Note:** In [Figure 2](#), 9-pin D-sub to 25-pin D-sub adapters are not shown. See [Table 1](#) for additional information on other optional adapters that can be used for a terminal connection.

[Figure 3](#) illustrates the array controller and cache module relationship. Controller A and cache A function together as a set; controller B and cache B function together as a set.



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- ❶ Controller A
- ❷ Controller B
- ❸ Cache A
- ❹ Cache B

**Figure 3: Controller and cache module bay locations**

# Replacing HSG60 and HSG80 controllers in single-controller configurations

Use the steps in “[Removing a controller](#)” below and “[Installing a controller](#)” on page 4 to replace a controller in a single-controller configuration.

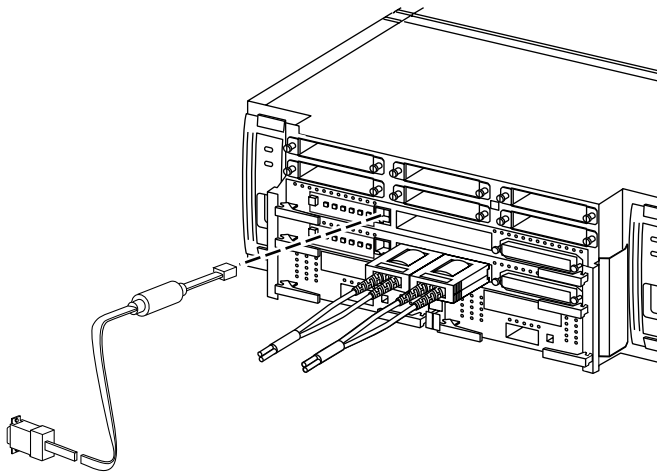


**Caution:** Static electricity can easily damage an array controller. Wear a snug-fitting, grounded ESD wrist strap.

## Removing a controller

Perform the following steps to remove a controller in a single-controller configuration:

1. Connect a PC or terminal to the controller maintenance port (see [Figure 4](#)) if the controller is operational. If the controller is not operational, proceed to [step 7](#).



**Figure 4: Connecting PC and terminal cables to the controller maintenance port (dual-redundant configuration shown)**

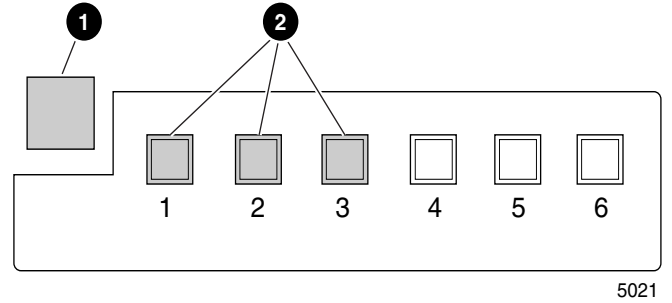
2. From the host console, halt all host activity to the controller, and dismount the logical units in the subsystem.
3. If you are using Microsoft® Windows® NT® or Windows 2000, shut down the server.
4. Run the *Fault Management Utility (FMU)* to obtain the last failure codes, if necessary.
5. Determine whether the disk was initialized with the `SAVE_CONFIGURATION` switch, and then perform one of the following options:
  - If the disk was *not* initialized with the `SAVE_CONFIGURATION` switch, locate existing information that will support the manual configuration of the subsystem, and then proceed to [step 6](#).
  - If the disk was initialized with the `SAVE_CONFIGURATION` switch, enter the following Command Line Interpreter (CLI) command from the controller prompt to save the current device configuration (for “this controller”):

```
CONFIGURATION SAVE
```

6. Shut down “this controller” with the following command:

```
SHUTDOWN THIS_CONTROLLER
```

**Note:** After the controller shuts down, the **Reset** button and the first three LEDs turn on (see [Figure 5](#)). This can take several minutes to occur, depending on the amount of data that needs to be flushed from the cache module. Proceed only after the **Reset** button stops flashing and remains on.



① Reset button

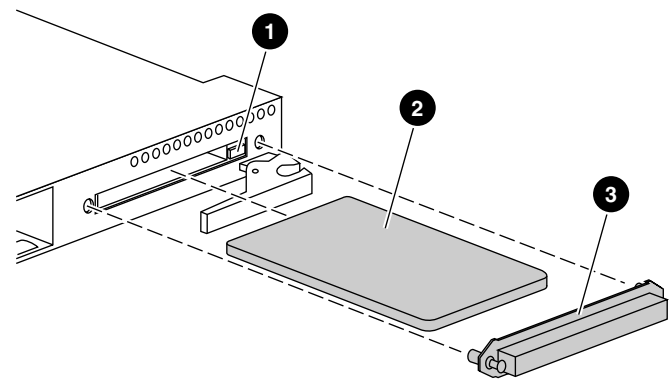
② First three LEDs

**Figure 5: Controller LEDs and Reset button**



**Caution:** The cache module may contain unwritten data if the controller crashes and it is not shut down with the `SHUTDOWN THIS_CONTROLLER` command. Loss of data can occur.

7. Remove the program card ESD cover (see [Figure 6](#)) and the program card, and then save them in an antistatic bag or on a grounded antistatic mat for the replacement controller.



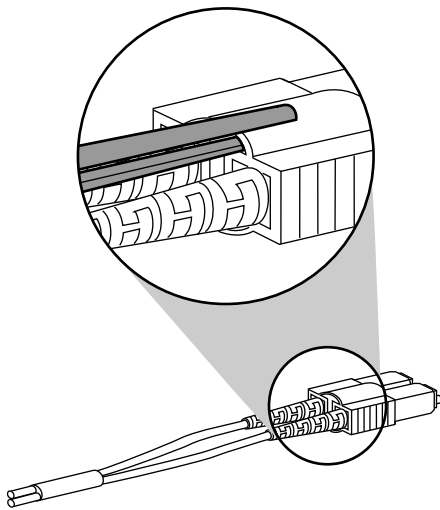
① Program card slot Eject button

② Program card

③ ESD cover

**Figure 6: Removing the controller ESD cover**

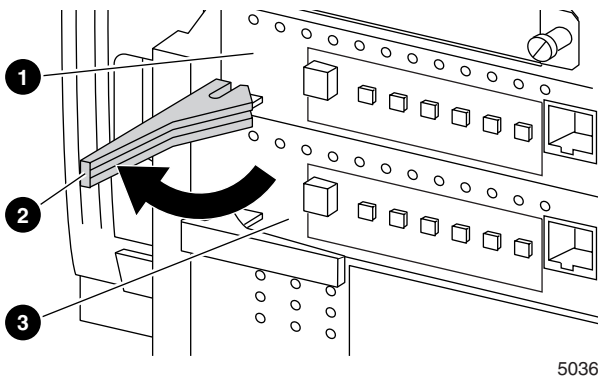
8. Disconnect all host bus cables or terminators from the controller. Use thin needle nose pliers to disconnect the cables if the extender clips are not installed on the optical cables.



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**Figure 7: Using a thin needle nose plier to disconnect cable**

9. If connected, disconnect the PC or terminal from the controller maintenance port.
10. Disengage both retaining levers (see [Figure 8](#)), remove the controller, and then place the controller in an antistatic bag or on a grounded antistatic mat.



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- ❶ Controller A
- ❷ Controller retaining lever
- ❸ Controller B

**Figure 8: Disengaging the controller retaining levers (dual-redundant configuration shown)**

## Installing a controller

Perform the following steps to install a controller in a single-controller configuration:



**Caution:** Carefully align the controller in the appropriate guide rails. Misalignment could damage the backplane.

**Note:** Ensure that the program card is not installed in the controller.

1. Insert the replacement controller into controller A bay and then engage the retaining levers.
2. Connect a PC or terminal to the controller maintenance port.
3. Press and hold the **Reset** button while inserting the program card into the controller.
4. Without releasing the **Reset** button, press and hold the **Port #5** button on the controller.
5. Release the **Reset** button.  
The controller resets its internal configuration cache and halts with an OCP code 33. LEDs 1, 2, 5 and 6, and the **Reset** button LED light up. The controller also resets its baud rate to 9600.
6. Release the **Port #5** button.
7. Press and release the **Reset** button.
8. The controller restarts. This process can take up to three minutes.

**Note:** Perform the following steps if the controller did not restart:

- a. Press and hold the **Reset** button.
- b. Reseat the controller program card.
- c. Release the **Reset** button.

9. Display details about the configured controller by entering the following command:

```
SHOW THIS_CONTROLLER FULL
```

10. Determine whether the cache is good, and then perform one of the following options:

- If the cache is *not* good, refer to Table 14 through Table 16 in the “Controller and Cache Replacement Troubleshooting” appendix of the *HP StorageWorks HSG60 and HSG80 Array Controller and Array Controller Software Maintenance and Service Guide*.
- If the cache is good, proceed to the next step.

11. Configure the controller as described in the appropriate array controller user guide or CLI reference guide.

12. Determine whether the current device configuration is saved on a disk drive, and then perform one of the following options:

- If the current device configuration is not saved on a disk drive, manually restore the current device configuration using existing information and the appropriate array controller user guide or CLI reference guide.
- If the current device configuration is saved on a disk drive, automatically restore the configuration by entering the following command below:

```
CONFIGURATION RESTORE
```

13. Determine whether the configuration restore process completed successfully, and then perform one of the following options:
  - Perform the following substeps if the configuration restore process did not complete successfully.
    - a. Reset the PC or terminal baud rate to match the original configuration of the controller.
    - b. Repeat [step 10](#) and [step 11](#) (on page 4).
    - c. Proceed to the next step after a successful configuration.
  - Proceed to the next step if the configuration restore process completed successfully.
14. Connect all host bus cables or terminators to the controller.
15. Mount the logical units on the host.
16. Restart the server if you are using Windows NT or Windows 2000.
17. Disconnect the PC or terminal from the controller maintenance port.
18. Install the program card ESD cover (see [Figure 6](#) on page 3).

## Replacing HSG60 and HSG80 controllers in dual-redundant controller configurations

Perform the steps in the following subsections to replace an HSG60 or HSG80 array controller in a dual-redundant configuration.

To differentiate on which component activity is being completed, symbols are displayed in the margin of text for your convenience. [Table 2](#) describes the symbols.

**Table 2: Replacement Procedure Symbols**

Symbol	Description
▲	Indicates that the procedural step must be completed for the <i>operational</i> controller, which is <i>not</i> being replaced.
↺	Indicates that the procedural step must be completed for the <i>controller that has failed or is to be replaced</i> .
🔧	Indicates that the procedural step must be completed for the <i>field replaceable unit (FRU) or new or replacement controller being installed</i> .

## Removing a controller

Perform the following steps to remove a controller in a dual-redundant controller configuration:

- ↺ 1. If the controller to be replaced (↺) is functional, complete the following substeps. Otherwise, go to [step 2](#).
  - ↺ a. Connect a PC or terminal to the maintenance port of the controller.
  - ↺ b. Press **Enter** or **Return** 2 or 3 times to display the controller prompt.
  - ↺ c. Start the *Virtual Terminal Display (VTDPY) Utility* by entering the following command:
 

```
RUN VTDPY
```
  - ↺ d. Record which units have I/O activity.
  - ↺ e. Exit *VTDPY* by pressing **Ctrl+Y**.
  - ↺ f. Restart the controller by entering the following command:
 

```
RESTART THIS_CONTROLLER
```

---

**Note:** Restarting the controller ensures that the unit persistent reservation flags transfer to the operational controller.

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- ↺ g. Disconnect the PC or terminal from the maintenance port.
- ▲ 2. For the operational controller (▲), complete the following substeps:
  - ▲ a. Connect a PC or terminal to the maintenance port of the operational controller (see [Figure 4](#) on page 3).

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**Note:** The controller connected to the PC or terminal becomes "this controller." The controller being removed becomes the "other controller."

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- ▲ b. Set the terminal baud rate to match the controller baud rate, and then press **Enter** or **Return** 2 to 3 times to display the controller prompt.
- ▲ c. Display and note configuration information (for example, the Failover mode, Cache mode, serial numbers, SCSI mode, and so forth) for the operational controller by entering the following command:
 

```
SHOW THIS_CONTROLLER
```
- ▲ d. Verify that the I/O for the controller that is being replaced fails over to the operational controller (see [substep 1d](#)) by entering the following command:
 

```
RUN VTDPY
```

**Note:** In Transparent Failover mode, units that failed over due to a **RESTART** command will revert back to preferred controller after about 1 minute.

- ▲ e. Exit *VTDPY* by pressing **Ctrl+Y**.
- ▲ f. Disable Failover mode, and take the controllers out of the dual-redundant configuration by entering the following command:  

```
SET NOFAILOVER
```
- ↻ 3. For the controller to be replaced, complete the following substeps:
  - ↻ a. Make sure that the **Reset** button (see [Figure 5](#) on page 3) is a constant green.
  - ↻ b. Remove the program card ESD cover (see [Figure 6](#) on page 3).
  - ↻ c. Remove the program card from the controller being replaced by pressing the program card slot **Eject** button (see [Figure 6](#) on page 3).
  - ↻ d. Save the ESD cover and program card in an antistatic bag or on a grounded antistatic mat for use with the replacement controller.
- ▲ 4. For the operational controller, complete the following substeps:
  - ▲ a. Start *FRUTIL* by entering the following command:  

```
RUN FRUTIL
```

*FRUTIL* automatically asks if you intend to replace the controller cache battery.
  - ▲ b. Enter **N(o)**. The **FRUTIL Main Menu** is displayed (see [Figure 9](#) and [Figure 10](#)).

```
FRUTIL Main Menu:
1. Replace or remove a controller or cache module
2. Install a controller or cache module
3. Replace a PVA module
4. Replace an I/O module
5. Exit
Enter choice: 1,2,3,4,5 ->
```

**Figure 9: FRUTIL Main Menu for a controller in a BA370**

```
FRUTIL Main Menu
1. Replace or remove a controller or cache module
2. Install a controller or cache module
3. Replace an I/O module
4. Exit
Enter choice: 1,2,3,4 ->
```

**Figure 10: FRUTIL Main Menu for a controller in a M2100 and M2200 enclosure**

- ▲ c. Enter option **1** to remove the controller or cache module. The **Replace or remove Options** screen is displayed (see [Figure 11](#)).

```
Replace or remove Options:
1. Other controller and cache module
2. Other controller module
3. Other cache module
4. Exit
Enter choice: 1,2,3,4 ->
```

**Figure 11: Replace or remove Options screen**

- ▲ d. Enter option **2** to remove the controller being replaced. The **Slot Designations** screen is displayed (see [Figure 12](#) and [Figure 13](#)).

```
Slot Designations (BA370)
(front view)
[ --- EMU --- ][ --- PVA --- ]
[ ----- Controller A ----- ]
[ ----- Controller B ----- ]
[ Cache Module A ] [ Cache Module B ]
```

**Figure 12: Slot Designations screen for controllers in a BA370 enclosure**

```
Slot Designations M2100/M2200
(back view)
[ Port1 ] [ Port3 ] [ Port5 ]
[ Port2 ] [ Port4 ] [ Port6 ]
[ ----- Controller A ----- ]
[ ----- Controller B ----- ]
[ Cache Module A ] [ Cache Module B ]
```

**Figure 13: Slot Designations screen for controllers in M2100 and M2200 enclosures**

- ↻ e. Make sure that the program card was removed from the controller to be replaced. Do not proceed until it is removed.
- ▲ f. Enter **Y(es)** to confirm the intent to remove the “other controller.”



**Caution:** Wait for *FRUTIL* to quiesce the device ports—indicated by an All device ports quiesced message. Failure to allow the ports to quiesce might result in data loss. Quiescing might take several minutes.

**Note:** After the ports quiesce, a countdown timer allows you a total of 2 minutes to remove the controller. After 2 minutes, the operational controller exits *FRUTIL* and resumes operations. If this happens, return to [step 4](#) and proceed.



- ↺ 5. For the controller to be replaced, complete the following substeps:



**Caution:** Use thin needle-nose pliers to remove the cable from the controller to avoid potentially damaging the cable for fiber optic cables without extender clips.

- ↺ a. Disconnect all host bus cables from the controller being removed.
- ↺ b. Disengage both controller retaining levers, and then remove the controller from the enclosure (see [Figure 8](#) on page 4).
- ↺ c. Place the controller in an antistatic bag or on a grounded antistatic mat.

- ▲ 6. For the operational controller, complete the following substeps:

- ▲ a. Observe that after the “other controller” is removed, *FRUTIL* restarts all device ports and asks if a replacement controller is available.
- ▲ b. Enter **N(o)** after *FRUTIL* asks you if a replacement controller is available, and then disconnect the PC or terminal from the controller maintenance port. *FRUTIL* exits. If you have a replacement controller available, complete the instructions in the “[Installing a controller](#)” below.



**Caution:** If reverting to a single-controller configuration, fill the vacant controller bay with a blank bezel to prevent the enclosure from developing an over-temperature condition.

## Installing a controller

Perform the following steps to install a controller in a dual-redundant controller configuration if only the controller is not installed:



**Caution:** Ensure that the controller being installed has the same ACS version as the operational and previous controller. Failure to follow this precaution causes controller configuration information to be erased, and then the controller is rendered unusable.

- ▲ 1. For the operational controller, complete the following substeps:
- ▲ a. Connect a PC or terminal to the maintenance port of the operational controller if not already connected.

**Note:** The controller connected to the PC or terminal becomes “this controller.” The controller being removed becomes the “other controller.”

- ▲ b. Ensure that the controller configuration is customized to your needs, and then record the controller configurations (for example, Failover mode, cache module status, serial numbers, SCSI mode, mirrored and nonmirrored information, and so forth).

- ▲ c. Start *FRUTIL* by entering the following command:

```
RUN FRUTIL
```

- ▲ d. Enter **N(o)** to the question about replacing the cache battery. The **FRUTIL Main Menu** is displayed.

- ▲ e. Enter option **2** to install a controller or cache module.

If both the controller and cache are missing, the **Install Options** screen is displayed (see [Figure 14](#)).

Install Options:

1. Other controller and cache module
2. Other controller module
3. Other cache module
4. Exit

NOTE: OPTION 1 DISABLED (So: Do cache, then controller.)

Enter choice: 1,2,3,4 ->

**Figure 14: Install Options screen**

- ▲ f. Enter option **4** to exit *FRUTIL*, and then install the cache module using procedures for a dual-redundant configuration, if both the controller and cache modules have been removed. (Refer to instructions for installing a cache module in a dual-redundant controller configuration of the *HP StorageWorks HSG60 and HSG80 Array Controller and Array Controller Software Maintenance and Service Guide* for more information.) Otherwise, continue to the next substep.
- g. Enter **Y(es)** to confirm the intent to install the “other controller.” *FRUTIL* quiesces the device ports and displays a message indicating that the controller is being installed.



**Caution:** Wait for *FRUTIL* to quiesce the device ports—indicated by an All device ports quiesced message. Failure to allow the ports to quiesce can result in data loss. Quiescing can take several minutes. The length of time is dependent on the amount of I/O activity and the number of units that are online.

**Note:** If *FRUTIL* times out before a replacement controller is installed, restart *FRUTIL*.

2. For the replacement controller, complete the following substeps:
  - a. Remove the program card in the replacement controller, if it is installed.
  - b. Insert the replacement controller (*without the program card installed*) into the appropriate bay, and then engage the controller retaining levers.
  - c. Press and hold the **Reset** button, insert the program card, and continue holding the **Reset** button.
  - d. Press and hold the replacement controller **Port #5** button, release the **Reset** button, and continue holding the **Port #5** button for an additional 5 to 20 seconds (see [Figure 5](#) on page 3). Release the **Port #5** button after 5 to 20 seconds.  
The nonvolatile memory in the replacement controller is updated, and the controller halts with an LED code of 33. Port LEDs 1, 2, 5, and 6 are on (see [Figure 5](#) on page 3).
  - e. Press and release the **Reset** button.  
The replacement controller restarts normally.
  - f. Wait at least 15 seconds after releasing the **Reset** button, and then immediately complete [substep 3a](#). Be sure to wait 15 seconds *before* continuing to [substep 3a](#).

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**Note:** A controller restart can take as long as 60 seconds, indicated by the temporary cycling of the port LEDs and a flashing **Reset** button.

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3. For the operational controller, complete the following substeps:
  - a. Press **Enter** or **Return** within 3 minutes of completing [substep 2f](#) to exit *FRUTIL*, and then wait 1 minute to allow the replacement controller to restart.

---

**Note:** If **Enter** or **Return** is not pressed within 3 minutes in [substep 3a](#), the operational controller issues an automated command to cancel the installation of the replacement controller. This cancellation causes all the port LEDs on the replacement controller to go off. If this situation occurs, press **Enter** to exit *FRUTIL*, and then enter the following command from the operational controller:

```
RESTART OTHER_CONTROLLER
```

---

- b. Verify that the status of the cache of the operational controller is good by entering the following command:

```
SHOW THIS_CONTROLLER
```

- c. Complete one of the following steps from the operational controller:
    - If the controller reported that the cache and mirrored cache (if enabled) is good in [substep 3b](#), proceed to [substep 3d](#).
    - If the controller reported that the cache and mirrored cache (if enabled) is not good in [substep 3b](#), refer to Table 14 through Table 16 in the “Controller and Cache Replacement Troubleshooting” appendix of the *HP StorageWorks HSG60 and HSG80 Array Controller and Array Controller Software Maintenance and Service Guide* and take corrective actions.
  - d. Disconnect the PC or terminal from the maintenance port of the operational controller.
4. For the replacement controller, complete the following substeps:
    - a. Connect a PC or terminal to the maintenance port of the replacement controller.
    - b. Perform the following:
      - i. Set the terminal baud rate to 9600.
      - ii. Press **Enter** or **Return** several times to get a prompt.
      - iii. Proceed to the next substep.
    - c. Perform the following verifications:
      - Verify that the controller restarts in the following reset configuration by entering the following command:  

```
SHOW THIS_CONTROLLER
```
      - Verify that the controller prompt displays *HSG>*.
      - Verify that the *NODE\_ID* is 0000-0000-0000-0000.
      - Verify that mirrored cache matches the original configuration.
      - Verify that the controller cache is good. Refer to Table 14 through Table 16 in the “Controller and Cache Replacement Troubleshooting” appendix of the *HP StorageWorks HSG60 and HSG80 Array Controller and Array Controller Software Maintenance and Service Guide* if the cache is *not* good.





**Caution:** Failure to clear an invalid cache message (especially a Cache is FAILED message) in [substep 4c](#) before setting the Failover mode can result in a recursive bugcheck condition that renders the controller unusable.



- d. Disconnect the PC or terminal from the maintenance port of the replacement controller.



5. For the operational controller, complete the following substeps:



- a. Connect a PC or terminal to the maintenance port of the operational controller.



**Caution:** In [substep 5b](#) below, entering the appropriate SET command is critical. Enabling an incorrect Failover mode can cause loss of data and incur system down time.



- b. Restore the Failover mode and re-establish the dual-redundant controller configuration with the following command. For example, if you noted that the Failover mode in [substep 2c](#) on page 5 was Multibus, enter the second command below.

```
SET FAILOVER  
COPY=THIS_CONTROLLER
```

The above commands copy the subsystem configuration from the operational controller to the controller that failed or is being replaced.



- c. Verify that the replacement controller restarts and that the cache for both the operational and replacement controller is good by entering the following command:

```
SHOW THIS_CONTROLLER  
SHOW OTHER_CONTROLLER
```

If the cache is *not* good, refer to Table 14 through Table 16 in the “Controller and Cache Replacement Troubleshooting” appendix of the *HP StorageWorks HSG60 and HSG80 Array Controller and Array Controller Software Maintenance and Service Guide*.

**Note:** The replacement controller can fail with a recursive bugcheck (halting with OCP code 25), and the **Reset** button LED remains steady on. Contact HP technical support or replace the controller if this condition occurs.



6. Disconnect the PC or terminal from the controller maintenance port of the operational controller.



7. Connect the host bus cables to the replacement controller.



8. Install the program card ESD cover on the controller being replaced.